TEACHER QUALITY RESEARCH GRANTS PROGRAM
CFDA NUMBER: 84.305

RELEASE DATE: May 6, 2005

REQUEST FOR APPLICATIONS NUMBER:
1. NCER-06-03 Teacher Quality – Mathematics and Science Research Grants Program
2. NCER-06-04 Teacher Quality – Reading and Writing Research Grants Program

INSTITUTE OF EDUCATION SCIENCES
http://www.ed.gov/about/offices/list/ies/programs.html

LETTER OF INTENT RECEIPT DATES:
1. Teacher Quality – Mathematics and Science: June 6, 2005
2. Teacher Quality – Reading and Writing: September 12, 2005

APPLICATION RECEIPT DATES:
1. Teacher Quality – Mathematics and Science: July 21, 2005, 8:00 p.m. Eastern time
2. Teacher Quality – Reading and Writing: November 3, 2005, 8:00 p.m. Eastern time

THIS REQUEST FOR APPLICATIONS CONTAINS THE FOLLOWING INFORMATION:

1. REQUEST FOR APPLICATIONS

The Institute of Education Sciences (Institute) invites applications for research projects that will contribute to its Teacher Quality research program. The Teacher Quality program will hold two

competitions this year: (a) Teacher Quality – Reading and Writing (Teacher Quality – Read/Write) and (b) Teacher Quality – Mathematics and Science (Teacher Quality – Math/Science). For these competitions, the Institute will consider only applications that meet the requirements outlined below under the section on Requirements of the Proposed Research.

2. OVERVIEW OF THE INSTITUTE'S RESEARCH PROGRAMS

The Institute supports research that contributes to improved academic achievement for all students, and particularly for those whose education prospects are hindered by conditions associated with poverty, minority status, disability, family circumstance, and inadequate education services. Although many conditions may affect academic outcomes, the Institute supports research on those that are within the control of the education system, with the aim of identifying, developing and validating effective education programs and practices. The conditions of greatest interest to the Institute are curriculum, instruction, assessment and accountability, the quality of the teaching and administrative workforce, resource allocation, and the systems and policies that affect these conditions and their interrelationships. In this section, the Institute describes the overall framework for its research grant programs. Specific information on the competition(s) described in this announcement begins in Section 3.

The Institute addresses the educational needs of typically developing students through its Education Research programs and the needs of students with disabilities through its Special Education Research programs. Both the Education Research and the Special Education Research programs are organized by academic outcomes (e.g., reading, mathematics), type of education condition (e.g., curriculum and instruction; teacher quality; administration, systems, and policy), grade level, and research goals.

a. *Outcomes*. The Institute's research programs focus on improvement of the following education outcomes: (a) readiness for schooling (pre-reading, pre-writing, early mathematics and science knowledge and skills, and social development); (b) academic outcomes in reading, writing, mathematics, and science; (c) student behavior and social interactions within schools that affect the learning of academic content; (d) skills that support independent living for students with significant disabilities; and (e) educational attainment (high school graduation, enrollment in and completion of post-secondary education).

b. *Conditions*. In general, each of the Institute's research programs focuses on a particular type of condition (e.g., curriculum and instruction) that may affect one or more of the outcomes listed previously (e.g., reading). The Institute's research programs are listed below according to the primary condition that is the focus of the program

(i) *Curriculum and instruction*. Several of the Institute's programs focus on the development and evaluation of curricula and instructional approaches. These programs include: (1) Reading and Writing Education Research, (2) Mathematics and Science Education Research, (3) Cognition and Student Learning Education Research, (4) Reading and Writing Special Education Research, (5) Mathematics and Science Special Education Research, (6) Language and Vocabulary Development Special Education Research, (7) Serious Behavior Disorders Special Education Research, (8) Early Intervention and

Assessment for Young Children with Disabilities Special Education Research, and (9) Secondary and Post-Secondary Outcomes Special Education Research.

(ii) *Teacher quality*. A second condition that affects student learning and achievement is the quality of teachers. The Institute funds research on how to improve teacher quality through its programs on (10) Teacher Quality – Read/Write Education Research, (11) Teacher Quality – Math/Science Education Research, (12) Teacher Quality – Read/Write Special Education Research, and (13) Teacher Quality – Math/Science Special Education Research.

(iii) *Administration, systems, and policy*. A third approach to improving student outcomes is to identify systemic changes in the ways in which schools and districts are led, organized, managed, and operated that may be directly or indirectly linked to student outcomes. The Institute takes this approach in its programs on (14) Individualized Education Programs Special Education Research (15) Education Finance, Leadership, and Management Research, (16) Assessment for Accountability Special Education Research, and (18) Research on High School Reform.

Applicants should be aware that some of the Institute's programs cover multiple conditions. Of the programs listed above, these include (3) Cognition and Student Learning, (14) Individualized Education Programs Special Education Research, and (15) Education Finance, Leadership, and Management. Finally, the Institute's National Center for Education Statistics supports the (17) National Assessment of Educational Progress (NAEP) Secondary Analysis Research Program. The NAEP Secondary Analysis program funds projects that cut across conditions (programs, practices, and policies) and types of students (regular education and special education students).

c. *Grade levels*. The Institute's research programs also specify the ages or grade levels covered in the research program. The specific grades vary across research programs and within each research program, and grades may vary across the research goals. In general, the Institute supports research for (a) pre-kindergarten and kindergarten, (b) elementary school, (c) middle school, (d) high school, (e) post-secondary education, (f) vocational education, and (g) adult education.

d. *Research goals*. The Institute has established five research goals for its research programs (http://www.ed.gov/about/offices/list/ies/programs.html). Within each research program one or more of the goals may apply: (a) Goal One – identify existing programs, practices, and policies that may have an impact on student outcomes and the factors that may mediate or moderate the effects of these programs, practices, and policies; (b) Goal Two – develop programs, practices, and policies that are potentially effective for improving outcomes; (c) Goal Three – establish the efficacy of fully developed programs, practices, or policies that either have evidence of potential efficacy or are widely used but have not been rigorously evaluated; (d) Goal Four – provide evidence on the effectiveness of programs, practices, and policies implemented at scale; and (e) Goal Five – develop or validate data and measurement systems and tools.

Applicants should be aware that the Institute does not fund research on every condition and every outcome at every grade level in a given year. For example, at this time, the Institute is *not*

funding research on science education interventions (curriculum, instructional approaches, teacher preparation, teacher professional development, or systemic interventions) at the post-secondary, or adult education levels. Similarly, at this time, the Institute is not funding research on measurement tools relevant to systemic conditions at the post-secondary or adult levels.

For a list of the Institute's FY 2006 grant competitions, please see Table 1 below. This list includes the Postdoctoral Research Training Fellowships in the Education Sciences, which is not a research grant program. Funding announcements for these competitions may be downloaded from the Institute's website at http://www.ed.gov/about/offices/list/ies/programs.html. Release dates for the Requests for Applications vary by competition.

Table 1: FY 2006 Research Grant Competitions:

1	Reading and Writing Education Research
2	Mathematics and Science Education Research
3	Cognition and Student Learning Education Research
4	Reading and Writing Special Education Research
5	Mathematics and Science Special Education Research
6	Language and Vocabulary Development Special Education Research
7	Serious Behavior Disorders Special Education Research
8	Early Intervention and Assessment for Young Children with Disabilities Special Education Research
9	Secondary and Post-Secondary Outcomes Special Education Research
10	Teacher Quality – Read/Write Education Research
11	Teacher Quality – Math/Science Education Research
12	Special Education Teacher Quality Research – Read/Write
13	Special Education Teacher Quality Research – Math/Science
14	Individualized Education Programs Special Education Research
15	Education Finance, Leadership, and Management Research
16	Assessment for Accountability Special Education Research
17	National Assessment of Educational Progress Secondary Analysis Research Program
18	Research on High School Reform
19	Education Research and Development Centers
20	Postdoctoral Research Training Fellowships in the Education Sciences

3. PURPOSE AND BACKGROUND

A. Purpose of the Teacher Quality research program.

The Institute's Teacher Quality Research program holds two competitions: (a) Teacher Quality – Reading and Writing and (b) Teacher Quality – Mathematics and Science. The general purpose of the Teacher Quality research program is to identify effective strategies for preparing future teachers or improving the performance of current classroom teachers in ways that increase student learning and school achievement. The Institute intends for the Teacher Quality research program to fulfill five goals: (1) identifying programs and practices for teacher preparation or teacher professional development that are potentially effective for improving reading, writing, mathematics, or science achievement, or school readiness at the preschool level, as well as

mediators and moderators of the effects of these programs and practices; (2) developing new programs and practices for teacher preparation or professional development that will eventually result in improving teacher practices and through them student learning and achievement; (3) establishing the efficacy of programs and practices for teacher preparation or professional development for improving teacher practices and through them student learning and achievement; (4) providing evidence of the effectiveness of teacher preparation or professional development programs that are implemented at scale and intended for improving teacher practices and through them student learning and achievement; and (5) developing and validating new assessments of teacher quality, or validating existing assessments for teachers at any grade level from pre-kindergarten through high school against measures of student achievement. Under these goals, the Institute supports development and evaluation of teacher preparation and teacher professional development interventions for (a) teaching reading, writing, mathematics or science from elementary school through high school; (b) improving school readiness skills (including development of pre-reading and pre-writing knowledge and skills, early mathematics and science concepts and skills) from pre-kindergarten through kindergarten; and (c) teaching basic skills in reading, writing, or mathematics to adults.

Long term outcomes of the Teacher Quality program will be an array of tools and strategies (e.g., pre-service and in-service programs, policies, assessments) that have been demonstrated to be effective for improving and assessing teacher performance in ways that are linked to increases in student achievement. In this Request for Applications, the term *teacher preparation* refers to pre-service training of teachers, and the term *professional development* refers to the in-service training of current teachers.

B. Background for the Teacher Quality research program

Too many students are unable to understand what they read. According to the 2003 National Assessment of Educational Progress (NAEP), 37 percent of fourth graders and 26 percent of eighth graders cannot read at the basic level; and on the 2002 NAEP 26 percent of twelfth graders cannot read at the basic level. That is, when reading grade appropriate text these students cannot extract the general meaning or make obvious connections between the text and their own experiences or make simple inferences from the text. In other words, they cannot understand what they have read. A similar picture emerges in the development of writing skills. According to the 2002 NAEP writing assessment 14 percent of fourth graders cannot write at the basic level, 15 percent of eighth graders cannot write at the basic level, and 26 percent of twelfth graders cannot write at the basic level.

Current levels of mathematics and science achievement at the elementary and secondary levels suggest that the United States is neither preparing the general population with levels of mathematics and science knowledge necessary for the 21st century workplace, nor producing an adequate pipeline to meet national needs for domestic scientists and mathematicians. In the 2000 NAEP, only two percent of U.S. students attained advanced levels of mathematics or science achievement by Grade 12. In mathematics, large numbers of U.S. students continue to score below the basic level. In the 2003 NAEP, 23 percent of Grade 4 students and 32 percent of Grade 8 students scored below the "basic" level. In the 2000 NAEP, the most recent mathematics assessment of Grade 12 students, 35 percent of grade 12 students scored below the “basic” level. At Grade 4, scoring below the basic level means that the student is likely to miss

problems such as using a ruler to find the total length of three line segments. At Grade 12, scoring below the basic level means that the student is unlikely to be able to solve problems such as finding the perimeter of a figure. Despite the fact that levels of mathematics achievement have improved over the past decade, achievement gaps remain wide with low levels of achievement being more likely among minority groups and students from low-income backgrounds.

As in mathematics, many U.S. students are not attaining mastery of rudimentary science knowledge and skills. In the 2000 NAEP, 34 percent of Grade 4 students**,** 39 percent of Grade 8 students and 47 percent of Grade 12 students scored below the "basic" level in science. At Grade 4, students performing below the basic level cannot read simple graphs. At Grade 12, students performing below the basic level are likely to miss problems such as drawing a simple diagram of the solar system. On the 2000 NAEP, only 22 percent of all Grade 12 students demonstrated knowledge of the essential features and function of genes – that is, that genes determine our individual characteristics and are made up of strands of DNA. As in mathematics, low levels of achievement are more likely among minority groups and students from low-income backgrounds.

Substantial numbers of students in middle and high school grades are taught mathematics or science by teachers without a college major or certification in the areas in which they are teaching. This is particularly the case in middle school. For example, the Condition of Education 2003 report (U.S. Dept. of Education, 2003) indicated that 23 percent of fifth through ninth graders, and 10 percent of high school students receive mathematics instruction from teachers who had neither a major nor certification in mathematics; in science, these percentages are 17 and 7 percent, respectively. There is some research demonstrating that students taught by "out-of-field" teachers learn less in mathematics and science than do students of teachers who are trained in the field in which they are teaching (Goldhaber & Brewer, 1997; Goldhaber & Brewer, 2000; Monk, 1994).

One approach to improving student learning is to identify effective curricula and instructional approaches; a second approach is to improve teachers' knowledge and skills. That is the approach taken by the Institute's Teacher Quality research program. Through this program, the Institute intends to improve the quality of teaching through development and evaluation of teacher preparation and professional development programs. Those interested in improving teacher quality through systemic practices and policies (e.g., alternative certification, incentives for recruiting and retaining highly qualified teachers) should refer to the Institute's Finance/Management program (http://www.ed.gov/about/offices/list/ies/programs.html).

Professional training in reading/writing and math/science requires more rigorous research evidence to help determine *what content* should be delivered to teachers, and *how to deliver* the content of the professional development, in order to have an impact on academic achievement. The program also addresses *how to assess* the appropriate teacher knowledge and skills that are predictive of student achievement.

(i) *What the content should be.* A major criticism of current teacher preparation programs is that many courses are not evidenced-based and are often poorly linked to state standards. Another criticism is that content and pedagogy courses are inadequate. Content courses do not train students how to teach specific content, and pedagogy courses typically focus

on generic, rather than content-specific instructional strategies. The Institute is interested in empirical tests of the efficacy of teacher preparation programs that are designed to develop broadly knowledgeable and competent pre-school and elementary school teachers who will be teaching all subjects to their students, as well as more specialized middle and secondary school teachers. The Institute is also interested in empirical examinations of teacher preparation programs that assess what teachers are taught, what they learn, and how this converges with state and national standards with regard to what the students these teachers will eventually teach should know and be able to do.

The Institute is also interested in examining professional development programs that are designed to develop different types of knowledge and skills. These include, but are not limited to, professional development programs designed to develop teachers' knowledge about a specific academic content area (e.g., mathematics, reading) and professional development programs designed around a specific curriculum, where the intent is to provide teachers with specific skills, strategies, and perhaps lesson plans for delivering this specific curriculum.

(ii) *How content should be delivered.* We have little reliable evidence about how to improve teacher preparation programs; how to appropriately balance content, pedagogy, and clinical training experiences; and who should deliver courses (e.g., discipline-based departments, like mathematics, or departments of teacher education). Similarly, although experts commonly believe that most current professional development offerings are not very effective, very little research exists that allows for clear causal interpretations of the impact of specific professional development programs or for knowing which elements of professional development programs (e.g., coaching) are critical or relatively more important than others.

(iii) *How should teacher knowledge be assessed.* The third issue addressed by the Teacher Quality research program is the development of practical assessments of teacher subject matter knowledge and pedagogical knowledge and skills and validation of these assessments (or existing assessments) against measures of student learning and achievement. Understanding what skills and knowledge make a teacher effective and identifying teacher candidates and current teachers who have these skills and knowledge is critical to developing a highly qualified teacher workforce.

Ideally, assessments of pedagogical knowledge and skills and subject matter knowledge would not only predict student achievement but also be practical to administer and cost-effective. Although some existing tests of pedagogical knowledge and subject matter knowledge have been correlated with the test takers' SAT or ACT scores (e.g., Gitomer, Latham, & Ziomek, 1999), validation of existing tests against measures of student learning and achievement remains to be accomplished. Hence, the Institute is interested in proposals to *validate existing measures* of pedagogical knowledge and subject matter knowledge against measures of student learning and achievement as well as proposals to *develop and validate new measures*. A system of assessment of teacher pedagogical and subject matter knowledge that predicts student outcomes could form the basis for an improved system of certification and for determining the effectiveness of professional development activities.

4. REQUIREMENTS OF THE PROPOSED RESEARCH

A. General Requirements

a. *Resubmissions*. Applicants who intend to revise and resubmit a proposal that was not funded in the Institute's FY 2005 competition must indicate on the application form that their FY 2006 proposal is a revised proposal. Their FY 2005 reviews will be sent to this year's reviewers along with their proposal. Applicants should indicate the revisions that were made to the proposal on the basis of the prior reviews using no more than 3 pages of Appendix A.

b. *Applying to multiple competitions.* Applicants may submit proposals to more than one of the Institute's FY 2006 competitions. Applicants may submit more than one proposal to a particular competition. However, applicants may only submit a given proposal once (i.e., applicants may not submit the same proposal or very similar proposals to multiple competitions or to multiple goals in the same competition).

c. *Applying to a particular goal within a competition*. To submit an application to one of the Institute's education research programs, applicants must choose the specific goal under which they are applying. Each goal has specific requirements.

d. *Inclusions and restrictions on interventions under Teacher Quality – Read/Write.*

(i) For the FY 2006 Teacher Quality – Read/Write competition, applicants must submit under *either* Goal One *or* Goal Two *or* Goal Three *or* Goal Four *or* Goal Five. Goal One incorporates efforts to identify conditions that are associated with and are potential determinants of student achievement in reading and writing and teacher quality. The understanding developed through Goal One awards is expected to be relevant to the design and implementation of future interventions. The typical methodology for Goal One will be the analysis of existing databases, including state longitudinal databases, using statistical approaches that allow for testing models of the relationships among variables in ways that strengthen hypotheses about paths of influence. For the FY 2006 Teacher Quality – Read/Write competition, Goal One is limited to teacher preparation and professional development for teaching reading or writing from elementary school through high school or teaching pre-reading and pre-writing from pre-kindergarten through kindergarten.

(ii) Applicants proposing to develop new interventions should apply under Goal Two. Under Goal Three, the Institute will accept proposals to conduct efficacy or replication trials of interventions. Goal Four targets evaluations of the effectiveness of interventions implemented at scale. The second through fourth goals can be seen as a progression from development (Goal Two) to efficacy (Goal Three), to effectiveness at scale (Goal Four).

.

Goals Two, Three, and Four are limited to (a) teaching reading or writing from elementary school through high school; (b) teaching pre-reading and pre-writing in pre-kindergarten or kindergarten; or (c) teaching reading or basic writing skills to adults through vocational or adult education programs and developmental/bridge programs designed to help under-prepared students acquire the skills to succeed in college.

(iii) Goal Five is to develop and validate assessments of teacher subject matter and pedagogical knowledge and skills for students in teacher preparation programs, and new or current teachers at any level from pre-kindergarten through high school. Goal Five covers assessments relevant to core academic content areas (e.g., reading, writing, social studies, history), except mathematics and science.

(iv) Programs may be for teachers of typically developing students or teachers of English language learners. The Institute is particularly interested in professional development programs for teachers who teach struggling readers in middle school or high school.

Applicants interested in teacher preparation or teacher professional development for teachers of students with disabilities should refer to the Institute's Special Education Teacher Quality Research Program (http://www.ed.gov/about/offices/list/ies/programs.html). This applies to teachers of students with disabilities, where "students with disabilities" is defined as in the Individuals with Disabilities Education Act as a child "(i) with mental retardation, hearing impairments (including deafness), speech or language impairments, visual impairments (including blindness), serious emotional disturbance (referred to in this title as 'emotional disturbance'), orthopedic impairments, autism, traumatic brain injury, other health impairments, or specific learning disabilities; and (ii) who, by reason thereof, needs special education and related services." (Part A, Sec. 602)

e. *Inclusions and restrictions on interventions under Teacher Quality – Math/Science.*

(i) For the FY 2006 Teacher Quality – Math/Science competition, applicants must submit under *either* Goal One *or* Goal Two *or* Goal Three *or* Goal Four *or* Goal Five. Goal One incorporates efforts to identify conditions that are associated with and are potential determinants of student achievement in mathematics and science and teacher quality. For the FY 2006 Teacher Quality – Math/Science competition, Goal One is limited to teacher preparation and professional development for teaching math/science at any grade from pre-kindergarten through high school.

(ii) Applicants proposing to develop new interventions should apply under Goal Two. Under Goal Three, the Institute will accept proposals to conduct efficacy or replication trials of interventions. Goal Four targets evaluations of the effectiveness of interventions implemented at scale. The second through fourth goals can be seen as a progression from development (Goal Two) to efficacy (Goal Three), to effectiveness at scale (Goal Four)

Goals Two, Three, and Four are limited to (a) teaching math/science at any grade from pre-kindergarten through high school or (b) teaching basic mathematics skills to adults through adult and vocational education programs or developmental/bridge programs designed to help under-prepared students acquire the skills to succeed in college.

(iii) Goal Five is to develop and validate assessments of teacher subject matter and pedagogical knowledge for students in teacher preparation programs, and new or current

teachers at any level from pre-kindergarten through high school. Goal Five covers assessments relevant to teaching mathematics and science.

(iv) Programs may be for teachers of typically developing students or teachers of English language learners.

Individuals who are interested in interventions for students with disabilities should refer to the Institute's Special Education Teacher Quality Research Program (http://www.ed.gov/about/offices/list/ies/programs.html). This applies to teachers of students with disabilities, where "students with disabilities" is defined as in the Individuals with Disabilities Education Act as a child "(i) with mental retardation, hearing impairments (including deafness), speech or language impairments, visual impairments (including blindness), serious emotional disturbance (referred to in this title as 'emotional disturbance'), orthopedic impairments, autism, traumatic brain injury, other health impairments, or specific learning disabilities; and (ii) who, by reason thereof, needs special education and related services." (Part A, Sec. 602)

B. Applications under Goal One (Identification)

Because the requirements for Goals One through Four are essentially the same across the Institute's competitions, a generic description is used in all of the relevant funding announcements. Consequently, the examples provided may not apply to a particular competition.

a. *Purpose of identification studies*. Through all of its research programs that include the Identification goal (Goal One), the Institute is primarily interested in analyses of multivariate data, such as longitudinal individual student data that exist in a number of state-level and district-level databases, to identify existing programs, practices, and policies that may have an impact on academic outcomes and to examine factors that may mediate or moderate the effects of these programs, practices, and policies.

For Goal One, the Institute expects investigators typically to use existing longitudinal data sets to capitalize on natural variation or discontinuities in education practices or policies. For example, in a particular year, a large district might have implemented a policy to hire master reading teachers for elementary schools. An investigator might propose interrupted time series analyses of the district's longitudinal datasets to examine changes in student outcomes that follow the implementation of the new policy. As a second example, with a state database linking individual student scores on annual reading assessments with teacher characteristics, an investigator might propose to analyze the relationship between teacher professional development and reading outcomes, controlling or accounting for other characteristics of students and teachers.

Value-added analyses can often strengthen the conclusions drawn from multivariate or interrupted times series analyses. Value-added analyses use statistically adjusted gain scores for individual students to control for student characteristics when estimating the effects of other variables. For example, the analysis of the relationship between teacher professional development and reading outcomes described previously would be more persuasive if individual

student outcomes in a particular year were adjusted for student scores on the same or a similar assessment at the end of the previous school year.

Evidence of the potential effectiveness of a program, practice, or policy obtained through a Goal One project has the possibility of being used to support a subsequent application for a Goal Three (Efficacy) project.

b. *Methodological requirements*.

(i) *Database*. The applicant should describe clearly the database(s) to be used in the investigation including information on sample characteristics, variables to be used, and ability to ensure access to the database if the applicant does not already have access to it. The database should be described in sufficient detail so that reviewers will be able to judge whether or not the proposed analyses may be conducted with the database. If multiple databases will be linked to conduct analyses, applicants should provide sufficient detail for reviewers to be able to judge the feasibility of the plan.

The applicant should describe the primary outcome measures to be used, including reliability and validity. In particular, applicants should provide sufficient information on the construct validity of the proposed measures. For example, if the applicant proposes to use a state database from which the primary outcome measure will be high school dropout rates, the applicant should detail how the high school dropout rates are derived.

(ii) *Primary data collection (optional).* For some projects, applicants may need to collect original data; these data will generally be used to supplement an existing longitudinal database in order to answer the question of interest. In such cases, the application must detail the methodology and procedures proposed for the primary data collection. Applicants should describe the sample and how the sample is related to or links to the proposed secondary database, the measures to be used (including information on the reliability and validity of the proposed instruments), and data collection procedures.

(iii) *Data analysis*. The applicant must include detailed descriptions of data analysis procedures. Because predictor variables relevant to education outcomes (e.g., student characteristics, teacher characteristics, school and district characteristics) often covary, the Institute expects investigators to utilize the most appropriate state-of-the-art analytic techniques to isolate the possible effects of variables of interest. Analytic strategies should allow investigators to examine mediators and moderators of programs and practices. The relation between hypotheses, measures, independent and dependent variables should be well specified.

c. *Personnel and resources*. Competitive applicants will have research teams that collectively demonstrate expertise in (a) the relevant academic content area (e.g., reading, mathematics), including where applicable, teacher education; and (b) implementation of and analysis of results from the research design that will be employed. Competitive applicants will have access to institutional resources that adequately support research.

d. *Awards*. Typical awards for projects at this level are $100,000 to $250,000 (total cost = direct + indirect costs) per year for 1 or 2 years. The size of the award depends on the scope of the project.

C. Applications under Goal Two (Development)

a. *Purpose of Goal Two (Development).* Through all of its research programs that include the Development goal (Goal Two), the Institute intends to support the development of interventions – programs, practices, and policies. From the Institute's standpoint, a funded development project would be successful if at the end of the 2 or 3 year development award, the investigators had a fully developed version of the proposed intervention, including for example, materials for students and teachers and preliminary data demonstrating the *potential* of the intervention for improving student outcomes. The Institute anticipates that investigators with successful development projects would submit proposals to subsequent competitions for Goal Three (Efficacy) awards. Thus, Goal Two applicants should be aware that the type of data (e.g., measures of student learning and achievement) they propose to collect under Goal Two awards should prepare them to apply for Goal Three awards.

b. *Requirements for proposed intervention*. Under Goal Two, the Institute will consider interventions that are in the early stages of development (e.g., those that do not have an entire curriculum ready to evaluate). Applicants should provide a strong rationale to support the use of the proposed intervention (e.g., curriculum, instructional practice, teacher professional development program or professional development delivery model). Reviewers will consider whether there is a strong theoretical foundation for the proposed intervention and whether the proposed intervention is grounded in empirical research. For example, a proposed reading intervention might be based on data obtained through laboratory experiments or classroom studies on strategy use in understanding expository text or research using eye tracking methods to ascertain where the focus of attention is during reading. In other cases, applicants might have already developed some components of the intervention and have pilot data showing the potential efficacy of those components. In such cases, the proposed project might be to complete the development of the intervention and collect data on the potential efficacy of the intervention. Alternatively one could imagine a proposal to develop an intervention for struggling high school readers that is based on an intervention developed for upper elementary and middle school students and for which there are some data showing the potential of the intervention for improving reading comprehension. In this case, the applicant would be proposing to modify this existing intervention to make it appropriate for high school students who are struggling readers and to collect data on the potential efficacy of the modified intervention. The point is that applicants should clearly and concisely articulate why the proposed intervention, as opposed to some other type of intervention, should be developed. Why is the proposed intervention likely to be successful for improving student learning and achievement?

In the rationale to support the proposed intervention, applicants should also address the *practical* importance of the proposed intervention. For example, when the proposed intervention is fully developed, will it form a set of math instructional strategies that has the potential to improve students' mathematics test scores in educationally meaningful increments, if it were implemented over the course of a semester or school year? Is the planned intervention sufficiently comprehensive, for instance, to address multiple types of difficulties that students encounter in

mastering algebra and to lead to improvements in students' grades or mathematics achievement test scores? In addition, would the proposed intervention be both affordable for schools and easily implemented by schools (e.g., not involve major adjustments to normal school schedules)? Appropriate applications for Goal Two may include, for example, proposals to develop and test curriculum materials that ultimately could be combined to form a complete stand-alone curriculum for a grade. Also appropriate would be proposals to develop supplementary materials that would be used in conjunction with existing curricula.

Finally, the Institute recognizes there are some fully developed interventions that would not qualify for investigation under Goal Three because there are no student outcome data indicating potential efficacy (as defined below) nor is there wide-spread use. In such cases, applicants may apply under Goal Two for support to conduct a small study to test whether the intervention shows evidence of potential efficacy as defined below. **Such projects are limited to a maximum of 2 years of support because the Institute expects the investigator to be ready to implement the intervention in schools or other education delivery settings at the beginning of the award period**. The applicant should clearly state in the beginning of the research narrative that he or she is applying under Goal Two with a fully developed intervention that has not been previously evaluated using student outcome measures.

c. *Methodological requirements*. In addition to providing a strong rationale for the proposed intervention, applicants should clearly and completely describe the proposed research methods for obtaining evidence of the *potential efficacy* of the proposed intervention. By potential efficacy, the Institute means that there are student outcome data indicating that exposure to the intervention is at least correlated with increases in student performance. For example, the applicant might compare pre-intervention to post-intervention gain scores on a standard measure of reading comprehension between students whose teachers received a new professional development program on reading instruction and students whose teachers did not receive professional development on reading instruction. Alternatively, the applicant might compare end-of-year science achievement scores in classrooms using the intervention with district scores for the same grade level. The Institute recognizes that such data do *not* provide causal evidence of the impact of the intervention on student outcomes. However, the purpose of the Development goal is to provide funds to develop interventions that on the basis of the theoretical rationale and relevant empirical evidence appear to have the potential to improve student learning and to collect preliminary data that would permit a reasonable evaluation of whether or not the intervention has sufficient potential to merit further investment.

(i) *Sample*. The applicant should define, as completely as possible, the sample to be selected and sampling procedures to be employed for the proposed study. Additionally, if the applicant proposes a longitudinal study, the applicant should show how the long-term participation of those sampled would be assured.

(ii) *Design*. The applicant must provide a detailed research design. Applicants should describe how potential threats to internal and external validity will be addressed.

(iii) *Measures*. For all proposals under Goal Two, investigators must include measures of relevant student outcomes (e.g., measures of reading or mathematics achievement).

Applicants to the Teacher Quality competitions must include measures of teacher practice, as well as measures of student learning and achievement. The applicant should provide information on the reliability and validity of the selected measures and justify the appropriateness of the proposed measures.

All applicants should note that data that only describe *process* (e.g., observations of student behavior during planned lessons, case study of the implementation of the curriculum, a discourse analysis of classroom discussions) or data only on teacher or student perception of improvement or ease of use will *not* be considered as sufficient evidence of the potential efficacy of the intervention.

(iv) *Process data*. Although the applicant must include relevant student outcome data to address the question of potential efficacy, this requirement does *not* preclude the collection of process data. In fact, the Institute encourages the collection of such data, which can help the researcher refine the intervention and provide insight into why an intervention does or does not work, and is or is not well implemented. Observational, survey, or qualitative methodologies are encouraged as a complement to quantitative measures of student outcomes to assist in the identification of factors that may, for example, explain the effectiveness or ineffectiveness of the intervention or identify conditions that hinder implementation of the intervention.

(v) *Data analysis*. The applicant must include detailed descriptions of data analysis procedures. For quantitative data, specific statistical procedures should be cited. The relation between hypotheses, measures, independent and dependent variables should be clear. For qualitative data, the specific methods used to index, summarize, and interpret data should be delineated.

d. *Personnel and resources*. Competitive applicants will have research teams that collectively demonstrate expertise in (a) specific academic domain (e.g., reading, mathematics or science, and if applicable, teacher education), (b) implementation of and analysis of results from the research design that will be employed, and (c) working with teachers, schools, or other education delivery settings that will be employed. Competitive applicants will have access to institutional resources that adequately support research activities and access to education delivery settings in which to conduct the research.

An applicant may involve *for-profit entities* in the project. Involvement of the commercial developer or distributor must not jeopardize the objectivity of the evaluation. *Collaborations including for-profit developers or distributors of education products must justify the need for Federal assistance to undertake the evaluation of programs that are marketed to consumers and consider cost-sharing part of the cost of the evaluation.*

e. *Awards*. Typical awards for projects at this level are $150,000 to $500,000 (total cost = direct + indirect costs) per year for 2 to 3 years. The size of the award depends on the scope of the project.

D. Applications under Goal Three (Efficacy and Replication Trials)

Under Goal Three, the Institute requests proposals to test the efficacy of fully developed interventions that already have evidence of potential efficacy. By *efficacy*, the Institute means the degree to which an intervention has a net positive impact on the outcomes of interest in relation to the program or practice to which it is being compared.

a. *Purpose of efficacy and replication trials*. Through all of its research programs that include the Efficacy and Replication goal (Goal Three), the Institute intends to fund efficacy trials to determine whether or not fully-developed interventions – programs, practices, policies – are effective under specified conditions (e.g., large urban high schools with large class sizes and high turnover rate among teachers) and with specific types of students (e.g., low income or high proportion of English language learners). Results from efficacy projects have less generalizability than results from effectiveness trials under Goal Four. The limited generalizability can arise both from the lack of a full range of types of settings and participants in the study, as well as through the intensive involvement of the developers and researchers in the implementation of the intervention. A well designed efficacy trial provides evidence on whether an intervention **can** work, but not whether it would work if deployed widely. Under Goal Three, applicants may propose an efficacy trial to determine if an intervention will work under specific conditions or a replication trial to determine if an intervention shown to produce a net positive impact in one setting will produce a net positive impact in a different setting or with a different population of students.

Under Goal Three, an applicant might propose to examine the efficacy of the intervention in an experimental study in which half of the classrooms are randomly assigned to the intervention condition and half of the classrooms are assigned to continue to use the district's standard curriculum. If the research team hypothesized that level of teacher professional development would meaningfully affect implementation and student outcomes, the team might propose instead to randomly assign one-third of the classrooms to an intervention condition in which teachers receive a training workshop for implementing the treatment curriculum at the beginning of the year, one-third of the classrooms to an intervention condition in which teachers receive the training workshop on implementation of the treatment curriculum with follow-up coaching sessions during the year, and one-third of classrooms to continue to use the district's standard curriculum. The point is that applicants should use the efficacy and replication trials to determine the conditions, if any, under which an intervention produces meaningful improvement on academic outcomes.

Also of interest to the Institute are proposals to compare the impact of two interventions that are based on different theoretical models. In such cases, the purpose might be to compare the efficacy of two well-developed approaches to improving student learning.

From the Institute's standpoint, a funded Efficacy/Replication project would be *methodologically successful* if at the end of the grant period, the investigators had rigorously evaluated the impact of a clearly specified intervention on relevant student outcomes and under clearly described conditions using a research design that meets the Institute's What Works Clearinghouse Level 1 study criteria (http://whatworks.ed.gov) whether or not the intervention is found to improve student outcomes relative to the comparison condition. Further, the Institute would consider methodologically successful projects to be *pragmatically successful* if the rigorous evaluation

determined that the intervention has a net positive impact on student outcomes in relation to the program or practice to which it is being compared.

b. *Requirements for proposed intervention*. Interventions appropriate for study under Goal Three may be (i) interventions that are fully developed and have evidence of the potential efficacy of the intervention or (ii) interventions that are already widely used within one or more states but have not been rigorously evaluated.

(i) For interventions that are *not* already in wide use, applicants must have an intervention that is fully developed and should provide a compelling rationale for the use of the intervention that includes (1) a strong theoretical foundation and (2) evidence of the potential efficacy of the intervention (see Goals One and Two for the Institute's definition of potential efficacy). Applicants who intend to devote a significant part of the project period to developing new components or materials for the intervention (e.g., additional curriculum modules, materials to train teachers to use the intervention curriculum) or new delivery approaches (e.g., material that was delivered by a teacher is proposed to be delivered via computer) should apply to Goal Two. Goal Three projects are limited to those interventions that are fully developed and have all materials (including teacher training programs) ready for implementation.

To establish that the proposed project will make a significant contribution to improving student learning and achievement, the applicant should clearly detail the theoretical basis for the intervention as well as the empirical evidence in support of the intervention. For example, empirical evidence of the potential efficacy of the intervention cited in the application could consist of data based on a single-group, pre-test/post-test study showing an increase in scores. As another example, the preliminary evidence could be a small quasi-experimental study in which the intervention was implemented in a few classrooms and students' end-of-year achievement test scores are compared to the scores of other classrooms in the same district.

Also appropriate for Goal Three applications are proposals to replicate the efficacy of an intervention in a different setting. For instance, in a previous study, the applicant could have demonstrated the efficacy of an intervention in a small random assignment trial in an urban school district, and a reasonable next step would be to *replicate* these findings in a poor rural school district.

(ii) To propose evaluations of interventions that are already in wide use but have not been rigorously evaluated (e.g., a commercially distributed curriculum), applicants should provide documentation of the widespread use of the program to justify the proposed efficacy evaluation. In such cases, applicants do ***not*** need to provide evidence of the potential efficacy of the intervention. Of course, if such evidence is available, applicants should include it.

c. *Methodological requirements*.

(i) *Sample*. The applicant should define, as completely as possible, the sample to be selected and sampling procedures to be employed for the proposed study. Additionally, the

applicant should describe strategies to insure that participants will remain in the study over the course of the evaluation.

(ii) *Design*. The applicant must provide a detailed research design. Applicants should describe how potential threats to internal and external validity will be addressed. Studies using randomized assignment to treatment and comparison conditions are strongly preferred. When a randomized trial is used, the applicant should clearly state the unit of randomization (e.g., students, classroom, teacher, or school). Choice of randomizing unit or units should be grounded in a theoretical framework. Applicants should explain the procedures for assignment of groups (e.g., schools, classrooms) or participants to treatment and comparison conditions.

Only in circumstances in which a randomized trial is not possible may alternatives that substantially minimize selection bias or allow it to be modeled be employed. Applicants proposing to use a design other than a randomized design must make a compelling case that randomization is not possible. Acceptable alternatives include appropriately structured regression-discontinuity designs or other well-designed quasi-experimental designs that come close to true experiments in minimizing the effects of selection bias on estimates of effect size. A well-designed quasi-experiment is one that reduces substantially the potential influence of selection bias on membership in the intervention or comparison group. This involves demonstrating equivalence between the intervention and comparison groups at program entry on the variables that are to be measured as program outcomes (e.g., reading achievement test scores), or obtaining such equivalence through statistical procedures such as propensity score balancing or regression. It also involves demonstrating equivalence or removing statistically the effects of other variables on which the groups may differ and that may affect intended outcomes of the program being evaluated (e.g., demographic variables, experience and level of training of teachers, motivation of parents or students). Finally, it involves a design for the initial selection of the intervention and comparison groups that minimizes selection bias or allows it to be modeled. For example, a very weak quasi-experimental design that would *not* be acceptable as evidence of program efficacy would populate the intervention condition with students who volunteered for the program to be evaluated, and would select comparison students who had the opportunity to volunteer but did not. In contrast, an acceptable design would select students in one particular geographical area of a city to be in the intervention; whereas students in another geographical area, known to be demographically similar, would be selected to be in the comparison condition. In the former case, self-selection into the intervention is very likely to reflect motivation and other factors that will affect outcomes of interest and that will be impossible to equate across the two groups. In the latter case, the geographical differences between the participants in the two groups would ideally be unrelated to outcomes of interest, and in any case, could be measured and controlled for statistically.

(iii) *Power*. Applicants should clearly address the power of the evaluation design to detect a reasonably expected and minimally important effect. Many evaluations of education interventions are designed so that clusters or groups of students, rather than individual students, are randomly assigned to treatment and comparison conditions. In such cases,

the power of the design depends in part on the degree to which the observations of individuals within groups are correlated with each other on the outcomes of interest. For determining the sample size, applicants need to consider the number of clusters, the number of individuals within clusters, the potential adjustment from covariates, the desired effect, the intraclass correlation (i.e., the variance between clusters relative to the total variance between and within clusters), and the desired power of the design (note, other factors may also affect the determination of sample size, such as using one-tailed vs two-tailed tests, repeated observations, attrition of participants, etc.; see Donner & Klar, 2000; Murray, 1998; W.T. Grant Foundation, http://www.wtgrantfoundation.org/info-url_nocat3040/info-url_nocat_show.htm?doc_id=225435&attrib_id=9485). When calculating the power of the design, applicants should anticipate the degree to which the magnitude of the expected effect may vary across the primary outcomes of interest.

(iv) *Measures*. Investigators should include relevant standardized measures of student achievement (e.g., standardized measures of mathematics achievement or reading achievement) in addition to other measures of student learning and achievement (e.g., researcher-developed measures). For Teacher Quality applications, applicants must also include measures of teacher practices. The applicant should provide information on the reliability, validity, and appropriateness of proposed measures.

(v) *Fidelity of implementation of the intervention*. Researchers should attend to questions of implementation and how best to train and support teachers in the use of these interventions. The applicant should specify how the implementation of the intervention will be documented and measured. The proposal should either indicate how the intervention will be maintained consistently across multiple groups (e.g., classrooms and schools) over time or describe the parameters under which variations in the implementation may occur. Investigators should propose research designs that permit the identification and assessment of factors impacting the fidelity of implementation.

(vi) *Comparison group, where applicable*. The applicant should describe strategies they intend to use to avoid contamination between treatment and comparison groups. Comparisons of interventions against other conditions are only meaningful to the extent that one can tell what students in the comparison settings receive or experience. Applicants should include procedures for describing practices in the comparison groups. Applicants should be able to compare intervention and comparison groups on the implementation of key features of the intervention so that, for example, if there is no observed difference in student performance between intervention and comparison students, they can determine if key elements of the intervention were also practiced and implemented in the comparison groups.

In evaluations of education interventions, students in the comparison group typically receive some kind of treatment (i.e., the comparison group is generally not a "no-treatment" control because the students are still in school experiencing the school's curriculum and instruction). For some evaluations, the primary question is whether the treatment is more effective than a particular alternative treatment. In such instances, the comparison group receives a well-defined treatment that is usually an important

comparison to the target intervention for theoretical or pragmatic reasons. In other cases, the primary question is whether the treatment is more effective than what is generally available and utilized in schools. In such cases, the comparison group might receive what is sometimes called "business-as-usual." That is, the comparison group receives whatever the school or district is currently using or doing in a particular area. Business-as-usual generally refers to situations in which the standard or frequent practice across the nation is a relatively undefined education treatment. However, business-as-usual may also refer to situations in which a branded intervention (e.g., a published curriculum) is implemented with no more support from the developers of the program than would be available under normal conditions. In either case, *using a business-as-usual comparison group is acceptable.* When business-as-usual is one or another branded intervention, applicants should specify the treatment or treatments received in the comparison group. In all cases, applicants should account for the ways in which what happens in the comparison group are important to understanding the net impact of the experimental treatment. As noted in the preceding paragraph, applicants should be able to compare the intervention and comparison groups on key features of the intervention.

The purpose here is to obtain information useful for *post hoc* explanations of why the experimental treatment does or does not improve student learning relative to the counterfactual.

(vii) *Mediating and moderating variables*. Observational, survey, or qualitative methodologies are encouraged as a complement to experimental methodologies to assist in the identification of factors that may explain the effectiveness or ineffectiveness of the intervention. Mediating and moderating variables that are measured in the intervention condition that are also likely to affect outcomes in the comparison condition should be measured in the comparison condition (e.g., student time-on-task, teacher experience/time in position).

The evaluation should be designed to account for sources of variation in outcomes across settings (i.e., to account for what might otherwise be part of the error variance). Applicants should provide a theoretical rationale to justify the inclusion (or exclusion) of factors/variables in the design of the evaluation that have been found to affect the success of education programs (e.g., teacher experience, fidelity of implementation, characteristics of the student population). The research should demonstrate the conditions and critical variables that affect the success of a given intervention. The most scalable interventions are those that can produce the desired effects across a range of education contexts.

(viii) *Data analysis*. All proposals must include detailed descriptions of data analysis procedures. For quantitative data, specific statistical procedures should be described. The relation between hypotheses, measures, independent and dependent variables should be clear. For qualitative data, the specific methods used to index, summarize, and interpret data should be delineated.

Most evaluations of education interventions involve clustering of students in classes and schools and require the effects of such clustering to be accounted for in the analyses, even when individuals are randomly assigned to condition. For random assignment studies, applicants need to be aware that typically the primary unit of analysis is the unit of random assignment.

Finally, documentation of the resources required to implement the program and a cost analysis needs to be part of the study.

d. *Personnel and resources*. Competitive applicants will have research teams that collectively demonstrate expertise in (a) the relevant academic content areas (e.g., reading, science, and where applicable, teacher education), (b) implementation of and analysis of results from the research design that will be employed, and (c) working with teachers, schools, or other education delivery settings that will be employed.

An applicant may involve curriculum developers or distributors (*including for-profit entities*) in the project, from having the curriculum developers as full partners in its proposal to using off-the-shelf curriculum materials without involvement of the developer or publisher. Involvement of the curriculum developer or distributor must not jeopardize the objectivity of the evaluation. *Collaborations including for-profit distributors of curriculum materials should justify the need for Federal assistance to undertake the evaluation of programs that are marketed to consumers and consider sharing the cost of the evaluation.*

Competitive applicants will have access to institutional resources that adequately support research activities and access to schools in which to conduct the research. Applicants are required to document the availability and cooperation of the schools or other education delivery settings that will be required to carry out the research proposed in the application via a letter of support from the education organization.

e. *Awards*. Typical awards for projects at this level will be $250,000 to $750,000 (total cost = direct + indirect costs) per year for up to 4 years. Larger budgets will be considered if a compelling case can be made for such support. The size of the award depends on the scope of the project.

E. Applications under Goal Four (Effectiveness Evaluations of Interventions Implemented at Scale)

a. *Purpose of effectiveness evaluations*. Through all of its research programs that include the Effectiveness Evaluations goal (Goal Four), the Institute intends to support impact evaluations of interventions – programs, practices, policies – that are implemented at scale to determine whether or not fully developed interventions are effective when the interventions are implemented under conditions that would be typical for the implementation of the intervention if a school district or other education delivery setting were to implement the intervention (i.e., without special support from the developer or the research team) and across a variety of conditions (e.g., different student populations, different types of schools). The primary question of interest is, "Does this intervention produce a net positive increase in student learning and

achievement relative to the variety of products or practices that are currently available and utilized by schools?"

b. *Requirements for proposed intervention*. To be considered for Goal Four awards, applicants should provide a clear rationale for the *practical* importance of the intervention. Applicants should address three questions. (1) Is the intervention likely to produce educationally meaningful effects on outcomes that are important to educational achievement (e.g., grades, achievement test scores) and, therefore, are of interest to parents, teachers, and education decision makers? (2) Is the intervention reasonably affordable to schools and other education delivery entities? (3) Is the intervention designed so that it is feasible for schools and other education delivery entities to implement the intervention? Interventions appropriate for study under Goal Four are interventions that have not yet been implemented at scale but have evidence of the efficacy of the program on a limited scale.

Applicants must provide *strong* evidence of the efficacy of the program as implemented on a small scale to justify the proposal to conduct a large-scale evaluation of the effectiveness of the intervention. As an example of strong evidence of efficacy, an applicant might describe the results of two or more small scale, rigorously conducted evaluations using random assignment to intervention and comparison conditions in which the efficacy of the intervention is demonstrated with different populations of students (e.g., students from middle income families in suburban high schools and students from low income families in poor rural high schools). Alternatively, a single efficacy evaluation might have involved schools from more than one district and included a diverse population of students and alone could constitute sufficient evidence of the efficacy of the intervention. Importantly, the evidence of efficacy must be based on the results of randomized field trials, or well-designed quasi-experimental evaluations.

c. *Implementation of the intervention*. One goal of evaluations of interventions implemented at scale is to determine if programs are effective when implemented at a distance from the developers of the program and with no more support from the developers of the program than would be available under normal conditions. A second goal is to determine if programs implemented under these conditions are effective in a variety of settings. Interventions that are effective at scale are those that can produce the desired effects across a range of education contexts. For Goal Four, the applicant should detail the conditions under which the intervention will be implemented and provide procedures that will capture the conditions and critical variables that affect the success of a given intervention.

d. *Methodological requirements*. For the methodological requirements for Goal Four projects, please refer to the methodological requirements listed under Goal Three.

e. *Personnel and resources*. Competitive applicants will have research teams that collectively demonstrate expertise in (a) the relevant academic content areas (e.g., reading, science, and where applicable, teacher education), (b) implementation of and analysis of results from the research design that will be employed, and (c) working with teachers, schools, or other education delivery settings that will be employed.

An applicant may involve curriculum developers or distributors (*including for-profit entities*) in the project, from having the curriculum developers as full partners in its proposal to using off-the-shelf curriculum materials without involvement of the developer or publisher. Involvement of the curriculum developer or distributor must not jeopardize the objectivity of the evaluation. *Collaborations including for-profit distributors of curriculum materials should justify the need for Federal assistance to undertake the evaluation of programs that are marketed to consumers and consider sharing the cost of the evaluation.*

When the developer of the intervention is involved in the project (whether or not the developer is a for-profit entity), applicants should clearly describe the role that the developer will take in the evaluation. Developers may not provide any training or support for the implementation that is not normally available to users of the intervention.

Competitive applicants will have access to institutional resources that adequately support research activities and access to schools in which to conduct the research. Applicants are required to document the availability and cooperation of the schools or other education delivery settings that will be required to carry out the research proposed in the application via a letter of support from the education organization.

f. *Awards*. The scope of Goal Four projects may vary. A smaller project might involve several schools within a large urban school district in which student populations vary in terms of SES, race, and ethnicity. A larger project might involve large numbers of students in several school districts in different geographical areas.

Awards for Goal Four projects may go up to a limit of $6,000,000 (total cost = direct + indirect costs) over a 5 year period. Typical awards are less. Awards depend in part on the number of sites, cost of data collection, and cost of implementation. The size of the award depends on the scope of the project.

F. Applications under Goal Five (Measurement)

Across the Institute's research programs, the Measurement goals differ in purpose. Requirements described below apply to the Teacher Quality research program.

a. Requirements for Goal Five (Measurement) proposals to the Teacher Quality research program.

(i) *Purpose of Teacher Quality Goal Five proposals*. For the Teacher Quality research program, the purpose of the Assessment goal is to support the development and validation of assessments that measure teacher subject matter and pedagogical knowledge in core academic subjects (e.g., reading, mathematics, and science). Such tests might be used, for example, as a component of a state certification process for determining highly qualified teachers.

(ii) *Requirements of proposed assessments*. Under Goal Five, applicants are invited to develop and/or validate assessments that measure teacher subject matter and pedagogical knowledge in core academic subjects including, for example, reading, mathematics,

science, history, and social studies. Assessments may be designed for teachers at any grade level (pre-kindergarten through high school). Applicants must propose to validate these measures against standardized measures of student learning and achievement (i.e., do teachers' scores on measures of content and pedagogical knowledge predict the achievement of their students?). Alternatively, applicants may propose to validate *existing* measures of teacher content and pedagogical knowledge against standardized measures of student achievement.

Applicants must provide a compelling rationale to support the development of the proposed assessment. Reviewers will consider the strength of the theoretical foundation for the proposed assessment, the existing empirical evidence supporting the proposed assessment, and whether the proposed assessment duplicates existing assessments of teacher subject matter knowledge and pedagogical knowledge. In developing assessments, applicants should consider the pragmatic constraints, such as ease of administration and cost, that states or districts will use to determine whether the instrument is a reasonable option for general use. The point is that applicants must clearly and concisely articulate why the proposed assessment, as opposed to some other assessment, should be developed and/or validated.

(iii) *Methodological requirements*. Applicants should detail the proposed procedures for developing the assessment instrument (e.g., procedures for determining which subject matter content and pedagogical knowledge are being "tapped" by the instrument (i.e., construct validity), procedures for selecting items to be used in the assessment, assessing difficulty of selected items, obtaining representative responses to questions). Applicants must clearly describe the research plans for assessing the validity and reliability of the instrument. Applicants should describe the characteristics and size of samples to be used in each study, procedures for collecting data, measures to be used, and data analytic strategies. As an example, investigators might conduct "value-added" analyses to compare student achievement across teachers scoring at different levels on the proposed teacher assessment. Value-added analyses use statistically adjusted gain scores for individual students to estimate, for example, the effect of a particular teacher on his or her students' learning relative to the effects of other teachers on their students' learning.

(iv) *Personnel and resources*. Competitive applicants will have research teams that collectively demonstrate expertise in (a) the academic content area, (b) instructional practice or teacher training, (c) assessment, (d) implementation of and analysis of results from the research design that will be employed, and (f) working with teachers, schools, or other education delivery settings in which the proposed assessment might be used. Competitive applicants will have access to institutional resources that adequately support research activities and access to schools in which to conduct the research.

(v) *Awards*. Typical awards under Goal Five will be $150,000 to $400,000 (total cost = direct + indirect costs) per year for up to 4 years. Larger budgets will be considered if a compelling case can be made for such support. The size of award depends on the scope of the project.

5. APPLICATIONS AVAILABLE

Application forms and instructions for the electronic submission of applications will be available for the programs of research listed in this RFA from the following web site:

https://ies.constellagroup.com

by the following dates:

a. Teacher Quality – Math/Science	June 23, 2005
b. Teacher Quality – Read/Write	October 3, 2005

6. MECHANISM OF SUPPORT

The Institute intends to award grants for periods up to 5 years pursuant to this request for applications. Please see specific details for each goal in the Requirements of the Proposed Research section of the announcement.

7. FUNDING AVAILABLE

The size of the award depends on the scope of the project. Please see specific details in the Requirements of the Proposed Research section of the announcement. Although the plans of the Institute include this program of research, awards pursuant to this request for applications are contingent upon the availability of funds and the receipt of a sufficient number of meritorious applications. The number of projects funded under a specific goal depends upon the number of high quality applications submitted to that goal. The Institute does not have plans to award a specific number of grants under each particular goal.

8. ELIGIBLE APPLICANTS

Applicants that have the ability and capacity to conduct scientifically valid research are eligible to apply. Eligible applicants include, but are not limited to, non-profit and for-profit organizations and public and private agencies and institutions, such as colleges and universities.

9. SPECIAL REQUIREMENTS

Research supported through this program must be relevant to U.S. schools.

Recipients of awards are expected to publish or otherwise make publicly available the results of the work supported through this program. Beginning June 1, 2005, the Institute asks IES-funded investigators to submit voluntarily to the Educational Resources Information Center (ERIC) an electronic version of the author's final manuscript upon acceptance for publication in a peer-reviewed journal, resulting from research supported in whole or in part, with direct costs from the Institute. The author's final manuscript is defined as the final version accepted for journal publication, and includes all modifications from the peer review process. Details of the Institute's policy are posted on the Institute's website at http://www.ed.gov/ies.

Applicants should budget for one meeting each year in Washington, DC, with other grantees and Institute staff. At least one project representative should attend the two-day meeting.

The Institute anticipates that the majority of the research will be conducted in field settings. Hence, the applicant is reminded to apply its negotiated off-campus indirect cost rate, as directed by the terms of the applicant's negotiated agreement.

Research applicants may collaborate with, or be, for-profit entities that develop, distribute, or otherwise market products or services that can be used as interventions or components of interventions in the proposed research activities. Involvement of the developer or distributor must not jeopardize the objectivity of the evaluation. Applications from or collaborations including such organizations should justify the need for Federal assistance to undertake the evaluation of programs that are marketed to consumers and consider sharing the cost of the evaluation, as well as sharing all or a substantial portion of the cost of the implementation of the product being evaluated (e.g., sharing the cost of textbooks for students).

10. LETTER OF INTENT

A letter indicating a potential applicant's intent to submit an application is optional, but encouraged, for each application. The letter of intent must be submitted electronically by the date listed at the beginning of this document, using the instructions provided at the following web site:

https://ies.constellagroup.com

The letter of intent should include a descriptive title, the goal which the application will address, and brief description of the research project (about 3,500 characters including spaces, which is approximately one page, single-spaced); the name, institutional affiliation, address, telephone number and e-mail address of the principal investigator(s); and the name and institutional affiliation of any key collaborators. The letter of intent should indicate the duration of the proposed project and provide an estimated budget request by year, and a total budget request. Although the letter of intent is optional, is not binding, and does not enter into the review of subsequent applications, the information that it contains allows Institute staff to estimate the potential workload to plan the review.

11. SUBMITTING AN APPLICATION

Applications must be submitted **electronically by 8:00 p.m**. **Eastern time** on the application receipt date, using the ED standard forms and the instructions provided at the following web site: https://ies.constellagroup.com

Application forms and instructions for the electronic submission of applications will be available by the following dates:

a. Teacher Quality – Math/Science June 23, 2005
b. Teacher Quality – Read/Write October 3, 2005

Potential applicants should check this site for information about the electronic submission procedures that must be followed and the software that will be required.

The application form approved for this program is OMB Number 1890-0009.

12. CONTENTS AND PAGE LIMITS OF APPLICATION

All applications and proposals for Institute funding must be self-contained within specified page limitations. Internet Web site addresses (URLs) may not be used to provide information necessary to the review because reviewers are under no obligation to view the Internet sites.

Sections described below, and summarized in Table 2, represent the body of a proposal submitted to the Institute and should be organized in the order listed below. Sections *a* (ED 424) through *i* (Appendix A) are required parts of the proposal. Section *j* (Appendix B) is optional. All sections must be submitted electronically.

Observe the page number limitations given in Table 2.

Table 2

Section	Page Limit	Additional Information
a. Application for Federal Education Assistance (ED 424)	n/a	
b. Budget Information Non-Construction Programs (ED 524) – Sections A and B	n/a	
c. Budget Information Non-Construction Programs (ED 524) – Section C	n/a	
d. Project Abstract	1	
e. Research Narrative	20	Figures, charts, tables, and diagrams may be included in Appendix A
f. Reference List	no limit	Complete citations, including titles and all authors
g. Curriculum Vita of Key Personnel	4 per CV	No more than 4 pages for each key person
h. Budget Justification	no limit	
i. Appendix A	15	
j. Appendix B	10	See restrictions

A. Application for Federal Education Assistance (ED 424)

The form and instructions are available on the website.

B. Budget Information Non-Construction Programs (ED 524)—Sections A and B

The application should include detailed budget information for each year of support requested and a cumulative budget for the full term of requested Institute support. Applicants should provide budget information for each project year using the ED 524 form (a link to the form is provided on the application website at https://ies.constellagroup.com). The ED 524 form has three sections: A, B, and C. Instructions for Sections A and B are included on the form.

C. Budget Information Non-Construction Programs (ED 524)—Section C

Instructions for ED 524 Section C are as follows. Section C is a document constructed or generated by the applicant and is typically an Excel or Word table. Section C should provide a

detailed itemized budget breakdown for each project year, for each budget category listed in Sections A and B. For each person listed in the personnel category, include a listing of percent effort for each project year, as well as the cost. Section C should also include a breakdown of the fees to consultants, a listing of each piece of equipment, itemization of supplies into separate categories, and itemization of travel requests (e.g. travel for data collection, conference travel, etc.) into separate categories. Any other expenses should be itemized by category and unit cost.

D. Project Abstract

The abstract is limited to one page, single-spaced (about 3,500 characters including spaces) and should include: (1) The title of the project; (2) the RFA goal under which the applicant is applying (e.g., development, efficacy); and brief descriptions of (3) the purpose (e.g., to develop and obtain preliminary evidence of potential efficacy of a reading comprehension intervention for struggling high school readers); (4) the setting in which the research will be conducted (e.g., 4 high schools from a rural school district in Alabama); (5) the population(s) from which the participants of the study(ies) will be sampled (age groups, race/ethnicity, SES); (6) if applicable, the intervention or assessment to be developed or evaluated or validated; (7) if applicable, the control or comparison condition (e.g., what will participants in the control condition experience); (8) the primary research method (e.g., experimental, quasi-experimental, single-subject, correlational, observational, descriptive); (9) measures of key outcomes; and (10) data analytic strategy.

E. Research Narrative

Incorporating the requirements outlined under the section on Requirements of the Proposed Research, the *research narrative* provides the majority of the information on which reviewers will evaluate the proposal. The research narrative must include the four sections described below (a. "Significance" through d. "Resources") in the order listed and conform to the **format requirements** described in section e.

a. *Significance (suggested: 2-3 pages).* Describe the contribution the study will make to providing a solution to an education problem identified in the Background Section of this RFA.

Provide a compelling rationale addressing, where applicable, the theoretical foundation, relevant prior empirical evidence, and the practical importance of the proposed project. For projects in which an intervention is proposed (whether to be developed or to be evaluated), include a description of the intervention along with the theoretical rationale and empirical evidence supporting the intervention. For projects in which an assessment is proposed (whether to be developed or evaluated), include a description of the assessment and a compelling rationale justifying the development or evaluation of the assessment. (Applicants proposing an intervention or assessment may use Appendix B to include up to 10 pages of examples of curriculum material, computer screens, and/or test items.)

b. *Research Narrative (suggested: 13-16 pages).*

(i) Include clear, concise hypotheses or research questions;

(ii) Present a clear description of, and a rationale for, the sample or study participants, including justification for exclusion and inclusion criteria and, where groups or conditions are involved, strategies for assigning participants to groups;

(iii) Provide clear descriptions of, and rationales for, data collection procedures;

(iv) Provide clear descriptions of and justification for measures to be used, including information on the reliability and validity of measures; and

(v) Present a detailed data analysis plan that justifies and explains the selected analysis strategy, shows clearly how the measures and analyses relate to the hypotheses or research questions, and indicates how the results will be interpreted. Quantitative studies should, where sufficient information is available, include an appropriate power analysis to provide some assurance that the sample is of sufficient size.

c. *Personnel (suggested: 1-2 pages).* Include brief descriptions of the qualifications of key personnel (information on personnel should also be provided in their curriculum vitae). For each of the key personnel, please describe the roles, responsibilities, and percent of time devoted to the project.

d. *Resources (suggested: 1-2 pages*). Provide a description of the resources available to support the project at the applicant's institution and in the field settings in which the research will be conducted.

e. *Format requirements*. The research narrative is limited to the equivalent of 20 pages, where a "page" is 8.5 in. x 11 in., on one side only, with 1 inch margins at the top, bottom, and both sides. Single space all text in the research narrative. To ensure that the text is easy for reviewers to read and that all applicants have the same amount of available space in which to describe their projects, applicants must adhere to the type size and format specifications for the entire research narrative including footnotes. See frequently asked questions available at https://ies.constellagroup.com on or before June 6, 2005.

Conform to the following four requirements:

(i) The height of the letters must not be smaller than 12 point;

(ii) Type density, including characters and spaces, must be no more than 15 characters per inch (cpi). For proportional spacing, the average for any representative section of text must not exceed 15 cpi;

(iii) No more than 6 lines of type within a vertical inch;

(iv) Margins, in all directions, must be at least 1 inch.

Applicants should check the type size using a standard device for measuring type size, rather than relying on the font selected for a particular word processing/printer combination. Figures, charts, tables, and figure legends may be smaller in size but must be readily legible. The type size and format used must conform to all four requirements. Small type size makes it difficult for reviewers to read the application; consequently, the use of small type will be grounds for the Institute to return the application without peer review. Adherence to type size and line spacing requirements is also necessary so that no applicant will have an unfair advantage, by using small type, or providing more text in their applications. **Note, these requirements apply to the PDF file as submitted**. As a practical matter, applicants who use a 12 point Times New Roman without compressing, kerning, condensing or other alterations typically meet these requirements.

Use only black and white in graphs, diagrams, tables, and charts. The application must contain only material that reproduces well when photocopied in black and white.

The 20-page limit does *not* include the ED 424 form, the one-page abstract, the ED 524 form and narrative budget justification, the curriculum vitae, or reference list. Reviewers are able to conduct the highest quality review when applications are concise and easy to read, with pages numbered consecutively.

F. Reference List

Please include complete citations, including titles and all authors, for literature cited in the research narrative.

G. Brief Curriculum Vita of Key Personnel

Abbreviated curriculum vita should be provided for the principal investigator(s) and other key personnel. *Each vitae is limited to 4 pages and should include information sufficient to demonstrate that personnel possess training and expertise commensurate with their duties (e.g., publications, grants, relevant research experience) and have adequate time devoted to the project to carry out their duties (e.g., list current and pending grants with the proportion of the individual's time allocated to each project).* The curriculum vita must adhere to the margin, format, and font size requirements described in the research narrative section.

H. Budget Justification

The *budget justification* should provide sufficient detail to allow reviewers to judge whether reasonable costs have been attributed to the project. It should include the time commitments and brief descriptions of the responsibilities of key personnel. *The budget justification should correspond to the itemized breakdown of project costs that is provided in Section C.* For consultants, the narrative should include the number of days of anticipated consultation, the expected rate of compensation, travel, per diem, and other related costs. A justification for equipment purchase, supplies, travel and other related project costs should also be provided in the budget narrative for each project year outlined in Section C. For applications that include subawards for work conducted at collaborating institutions, applicants should submit an itemized budget spreadsheet for each subaward for each project year, and the details of the subaward costs should be included in the budget narrative. Applicants should use their institution’s federal indirect cost rate and use the off-campus indirect cost rate where appropriate (see instructions

under Section 9 Special Requirements). If less than 75 percent of total indirect costs are based on application of the off-campus rate, the applicant should provide a detailed justification.

I. Appendix A

The purpose of A*ppendix A* is to allow the applicant to include any figures, charts, or tables that supplement the research text, examples of measures to be used in the project, and letters of agreement from partners (e.g., schools) and consultants. In addition, in the case of a resubmission, the applicant may use up to 3 pages of the appendix to describe the ways in which the revised proposal is responsive to prior reviewer feedback. These are the only materials that may be included in Appendix A; all other materials will be removed prior to review of the application. Narrative text related to any aspect of the project (e.g., descriptions of the proposed sample, the design of the study, or previous research conducted by the applicant) should be included in the 20-page research narrative. Letters of agreement should include enough information to make it clear that the author of the letter understands the nature of the commitment of time, space, and resources to the research project that will be required if the application is funded. The appendix is limited to 15 pages.

J. Appendix B (optional)

The purpose of Appendix B is to allow applicants who are proposing an intervention or assessment to include examples of curriculum material, computer screens, test items, or other materials used in the intervention or assessment. These are the only materials that may be included in Appendix B; all other materials will be removed prior to review of the application. Appendix B is limited to 10 pages. Narrative text related to the intervention (e.g., descriptions of research that supports the use of the intervention/assessment, the theoretical rationale for the intervention/assessment, or details regarding the implementation or use of the intervention/assessment) should be included in the 20-page research narrative.

K. Additional Forms

Please note that applicants selected for funding will be required to submit the following certifications and assurances before a grant is issued:

(1) SF 424B-Assurances-Non-Construction Programs
(2) ED-80-0013-Certification Regarding Lobbying, Debarment, Suspension and other Responsibility Matters; and Drug-Free Workplace Requirements
(3) ED 80-0014 (if applicable)-Lower Tier Certification
(4) SF-LLL (if applicable) - Disclosure of Lobbying Activities
(5) Protection of Human Research Subjects assurance and/or Institutional Review Board certification, as appropriate

13. APPLICATION PROCESSING

Applications must be received by **8:00 p.m. Eastern time** on the application receipt date listed in the heading of this request for applications. Upon receipt, each application will be reviewed for completeness and for responsiveness to this request for applications. Applications that do not address specific requirements of this request will be returned to the applicants without further consideration.

14. PEER REVIEW PROCESS

Applications that are complete and responsive to this request will be evaluated for scientific and technical merit. Reviews will be conducted in accordance with the review criteria stated below by a panel of scientists who have substantive and methodological expertise appropriate to the program of research and request for applications.

Each application will be assigned to one of the Institute's scientific review panels. At least two primary reviewers will complete written evaluations of the application, identifying strengths and weaknesses related to each of the review criteria. Primary reviewers will independently assign a score for each criterion, as well as an overall score, for each application they review. Based on the overall scores assigned by primary reviewers, an average overall score for each application will be calculated and a preliminary rank order of applications prepared before the full peer review panel convenes to complete the review of applications.

The full panel will consider and score only those applications deemed to be the most competitive and to have the highest merit, as reflected by the preliminary rank order. A panel member may nominate for consideration by the full panel any proposal that he or she believes merits full panel review but would not have been included in the full panel meeting based on its preliminary rank order.

15. REVIEW CRITERIA FOR SCIENTIFIC MERIT

The goal of Institute-supported research is to contribute to the solution of education problems and to provide reliable information about the education practices that support learning and improve academic achievement and access to education for all students. Reviewers will be expected to assess the following aspects of an application in order to judge the likelihood that the proposed research will have a substantial impact on the pursuit of that goal. Information pertinent to each of these criteria is also described above in the section on Requirements of the Proposed Research and in the description of the research narrative, which appears in the section on Contents and Page Limits of Application.

Significance	Does the applicant make a compelling case for the potential contribution of the project to the solution of an education problem? For cases in which the applicant proposes to develop or evaluate an intervention, does the applicant present a strong rationale justifying the need to evaluate the selected intervention (e.g., does prior evidence suggest that the intervention is likely to substantially improve student learning and achievement)?
Research Plan	Does the applicant present (a) clear hypotheses or research questions; (b) clear descriptions of and strong rationales for the sample, the measures (including information on the reliability and validity of measures), data collection procedures, and research design; and (c) a detailed and well-justified data analysis plan? Does the research plan meet the requirements described in the section on the Requirements of the Proposed Research and in the description of the research narrative in the section on Contents and Page Limits? Is the research plan appropriate for answering the research questions or testing the proposed hypotheses?

Personnel — Does the description of the personnel make it apparent that the principal investigator, project director, and other key personnel possess the training and experience and will commit sufficient time to competently implement the proposed research?

Resources — Does the applicant have the facilities, equipment, supplies, and other resources required to support the proposed activities? Do the commitments of each partner show support for the implementation and success of the project?

16. RECEIPT AND REVIEW SCHEDULE

A. Letter of Intent Receipt Dates:

a. Teacher Quality – Math/Science	June 6, 2005
b. Teacher Quality – Read/Write	September 12, 2005

B. Application Receipt Dates:

a. Teacher Quality – Math/Science	July 21, 2005, 8:00 p.m. Eastern time
b. Teacher Quality – Read/Write	November 3, 2005, 8:00 p.m. Eastern time

C. Earliest Anticipated Start Date:

a. Teacher Quality – Math/Science	March 1, 2006
b. Teacher Quality – Read/Write	June 1, 2006

17. AWARD DECISIONS

The following will be considered in making award decisions:
Scientific merit as determined by peer review
Responsiveness to the requirements of this request
Performance and use of funds under a previous Federal award
Contribution to the overall program of research described in this request
Availability of funds

18. INQUIRIES MAY BE SENT TO:

Teacher Quality – Read/Write and Math/Science
Dr. Harold Himmelfarb
Institute of Education Sciences
555 New Jersey Avenue, NW
Washington, DC 20208

Email: Harold.Himmelfarb@ed.gov
Telephone: (202) 219-2031

19. PROGRAM AUTHORITY

20 U.S.C. 9501 et seq., the "Education Sciences Reform Act of 2002," Title I of Public Law 107-279, November 5, 2002. This program is not subject to the intergovernmental review requirements of Executive Order 12372.

20. APPLICABLE REGULATIONS

The Education Department General Administrative Regulations (EDGAR) in 34 CFR parts 74, 77, 80, 81, 82, 84, 85, 86 (part 86 applies only to institutions of higher education), 97, 98, and 99. In addition 34 CFR part 75 is applicable, except for the provisions in 34 CFR 75.100, 75.101(b), 75.102, 75.103, 75.105, 75.109(a), 75.200, 75.201, 75.209, 75.210, 75.211, 75.217, 75.219, 75.220, 75.221, 75.222, and 75.230.

21. REFERENCES

Donner, A., & Klar, N. (2000). *Design and Analysis of Cluster Randomization Trials in Health Research*. New York: Oxford University Press.

Gitomer, D. H., Latham, A. S., & Ziomek, R. (1999). *The Academic Quality of Prospective Teachers: The Impact of Admissions and Licensure Testing.* www.ets.org/praxis/

Goldhaber, D. D. & Brewer, D. J. (1997). Why don't schools and teachers seem to matter? Assessing the impact of unobservables on education. *Journal of Human Resources, 32,* 505-523.

Goldhaber, D. D. & Brewer, D. J. (2000). Does teacher certification matter? High school certification status and student achievement. *Educational Evaluation and Policy Analysis, 22* (2), 129-145.

Monk, D. H. (1994). Subject area preparation of secondary mathematics and science teachers and student achievement. *Economics of Education Review, 13,* 125-145.

Murray, D. M. (1998). *Design and Analysis of Group-Randomized Trials*. New York: Oxford.

U.S. Department of Education, National Center for Education Statistics. (2003). *The Condition of Education 2003,* NCES 2003-067. Washington, DC.